

What is claimed is:

1. A gene targeting construct, comprising  
a transgene encoding a polypeptide comprising a  
rod outer segment (ROS) targeting signal, said transgene  
5 flanked by 5' and 3' DNA sequences which are homologous  
to the mouse rhodopsin gene,  
wherein homologous recombination between said  
construct and a mouse rhodopsin gene results in operable  
association between said transgene and a rod-specific  
10 regulatory sequence.
2. The construct of claim 1, wherein said  
polypeptide is a G protein-coupled receptor (GPCR).
3. The construct of claim 2, wherein said GPCR  
is a cannabinoid receptor.
- 15 4. The construct of claim 1, wherein said  
polypeptide is a fusion protein.
5. The construct of claim 1, wherein said ROS  
targeting signal comprises SEQ ID NO:4.
6. The construct of claim 1, further  
20 comprising a positive selection marker.
7. The construct of claim 6, wherein said  
positive selection marker is a neomycin resistance gene.
8. The construct of claim 6, wherein said  
positive selection marker is flanked by loxP sites.

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9. The construct of claim 1, further comprising a negative selection marker.

10. The construct of claim 9, wherein said negative selection marker is a diphtheria toxin A  
5 fragment gene.

11. The construct of claim 1, wherein said rod-specific regulatory sequence comprises a rhodopsin promoter.

10 12. The construct of claim 1, wherein the 5' flanking DNA sequence comprises a mouse rhodopsin promoter.

13. The construct of claim 1, wherein the 3' flanking sequence comprises a portion of exon 1 of mouse  
15 rhodopsin.

14. The construct of claim 1, wherein the 3' flanking sequence comprises exon 2 of mouse rhodopsin.

15. A vector comprising the construct of claim 1.

20 16. A cell comprising the construct of claim 1.

17. A mouse cell whose genome comprises:  
a) a functional disruption of one or both endogenous rhodopsin gene alleles, and

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b) a transgene encoding a polypeptide comprising a ROS targeting signal operably associated with a rod-specific regulatory sequence, wherein said polypeptide is not a rhodopsin.

5           18. The cell of claim 17, wherein said polypeptide is a GPCR.

19. The cell of claim 18, wherein said GPCR is a cannabinoid receptor.

10           20. The cell of claim 17, wherein said polypeptide is a fusion protein.

21. The cell of claim 17, wherein said ROS targeting signal comprises SEQ ID NO:4.

15           22. The cell of claim 17, wherein said genome comprises a functional disruption of both endogenous rhodopsin gene alleles.

23. The cell of claim 17, wherein said transgene is inserted into one or both endogenous rhodopsin gene alleles.

20           24. The cell of claim 17, which is an embryonic stem cell.

25. The cell of claim 17, which is in a mouse.

26. The cell of claim 17, which is isolated from a mouse.

09990135-112101

27. The cell of claim 26, which is a rod cell.

28. An extract of the cell of claim 27,  
comprising an outer segment membrane of said cell.

5           29. A substantially purified transgenic  
polypeptide comprising a ROS targeting signal, isolated  
from the rod cell of claim 27, or from an extract  
thereof.

10           30. A mouse whose genome comprises:  
a) a functional disruption of one or both  
endogenous rhodopsin gene alleles, and  
b) a transgene encoding a polypeptide  
comprising a ROS targeting signal operably associated  
with a rod-specific regulatory sequence,  
15           wherein said polypeptide is not a rhodopsin.

31. The mouse of claim 30, wherein said  
polypeptide is a GPCR.

32. The mouse of claim 31, wherein said GPCR  
is a cannabinoid receptor.

20           33. The mouse of claim 30, wherein said  
polypeptide is a fusion protein.

34. The mouse of claim 30, wherein said ROS  
targeting signal comprises SEQ ID NO:4.

25           35. The mouse of claim 30, wherein said genome  
comprises a functional disruption of both endogenous  
rhodopsin gene alleles.

09990185-112101

36. The mouse of claim 30, wherein said transgene is inserted into one or both endogenous rhodopsin gene alleles.

37. A rod cell or outer membrane extract  
5 thereof, isolated from the mouse of claim 30.

38. A substantially purified transgenic polypeptide comprising a ROS targeting signal, isolated from the rod cell or extract of claim 37.

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